



Drinking Water Surveillance Program

**THUNDER BAY
(BARE POINT)
WATER TREATMENT
PLANT**

Annual Report 1988



**Environment
Environnement**
for People, Environment

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THUNDER BAY (BARE POINT)
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE
PROGRAM

ANNUAL REPORT 1988

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

THUNDER BAY (BARE POINT) WATER TREATMENT PLANT **1988 ANNUAL REPORT**

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 52 plants are being monitored.

The Thunder Bay (Bare Point) Water Treatment Plant is a direct filtration plant which treats water from Lake Superior. The treatment process consists of coagulation, flocculation, filtration and disinfection. The plant has a design capacity of 70.46 x 1000 m³/day. This plant together with the Loch Lomond Supply serves a population of approximately 113,000.

Water samples from two sites in the distribution system were taken on a monthly basis beginning in May; sampling of the raw and treated water from the plant began in September. The Thunder Bay (Bare Point) Water Treatment Plant was sampled monthly for approximately 160 parameters. Parameters were divided into the following groups: Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organic (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Chlorophenols and Specific Pesticides were analysed in November only.

A summary of results is shown in Table 1.

Inorganic and Physical parameters were below any applicable health related ODWOS.

Of a total of approximately 110 Organic parameters tested for on a monthly basis, none exceeded health related guidelines.

During 1988 the DWSP sampling results indicated that the Thunder Bay (Bare Point) Water Treatment Plant produced good quality water at the plant and this quality was maintained in the distribution system.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP)

SUMMARY TABLE BY SCAN

SCAN	RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TESTS	POSITIVE	XPOSITIVE	TESTS	POSITIVE	XPOSITIVE	TESTS	POSITIVE	XPOSITIVE	TESTS	POSITIVE	XPOSITIVE	TESTS	POSITIVE	XPOSITIVE
BACTERIOLOGICAL	9	2	22	10	1	10	15	2	13	4	1	25	19	2	10
CHEMISTRY (FLD)	12	12	100	24	24	100	40	40	100	18	18	100	60	60	100
CHEMISTRY (LAB)	77	55	71	80	51	63	138	101	73	70	54	77	208	150	72
METALS	96	32	33	96	32	33	108	66	35	94	40	42	282	100	35
CHLOROBACILLI	56	0	0	56	0	0	56	0	0	28	0	0	84	0	0
CHLOROPHENOLS	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0
PAN	68	0	0	68	0	0	0	0	0	0	0	0	0	0	0
PESTICIDES & PCB	136	0	0	123	0	0	132	0	0	68	0	0	200	0	0
PHENOLICS	4	3	75	4	3	75	0	0	0	0	0	0	0	0	0
SPECIFIC PESTICIDES	28	0	0	28	0	0	0	0	0	0	0	0	0	0	0
VOLATILES	115	1	0	115	12	10	113	13	11	58	6	10	171	19	11
TOTAL	607	105	610	123	682	222	340	119	1024	331	1024	331	1024	331	1024

NO HEALTH RELATED GUIDELINES WERE EXCEEDED

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
 A '0' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM
THUNDER BAY (BARE POINT) WATER TREATMENT PLANT
1988 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 52 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at the Thunder Bay (Bare Point) Water Treatment Plant in May 1988.

This report contains information and results for 1988.

PLANT DESCRIPTION

The Thunder Bay (Bare Point) Water Treatment Plant is a direct filtration plant which treats water from Lake Superior. The process consists of coagulation, flocculation, filtration and disinfection. A polyelectrolyte is added as a coagulant aid. The plant has a rated capacity of $70.46 \times 1000 \text{ m}^3/\text{day}$ and sample day flows ranging from $29.5 \times 1000 \text{ m}^3/\text{day}$ to $47.2 \times 1000 \text{ m}^3/\text{day}$. This plant together with the Loch Lomond supply serves a population of 113,000.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from five DWSP approved locations;

- i) Plant Raw - The water originated from the raw water wet well prior to chlorination and was sampled through a stainless steel pump and sample line. The sample tap is located in the plant laboratory.
- ii) Plant Treated - The water originated from the highlift discharge after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located in the plant laboratory.
- iii) Distribution System - Site 1 - The house location and sampling conditions are unavailable.
- iv) Distribution System - Site 2 - The house location and sampling conditions are unavailable.
- v) Distribution System - Site 3 - The house location and sampling conditions are unavailable.

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM
SITE LOCATION MAP
THUNDER BAY (BARE POINT) WATER SUPPLY SYSTEM

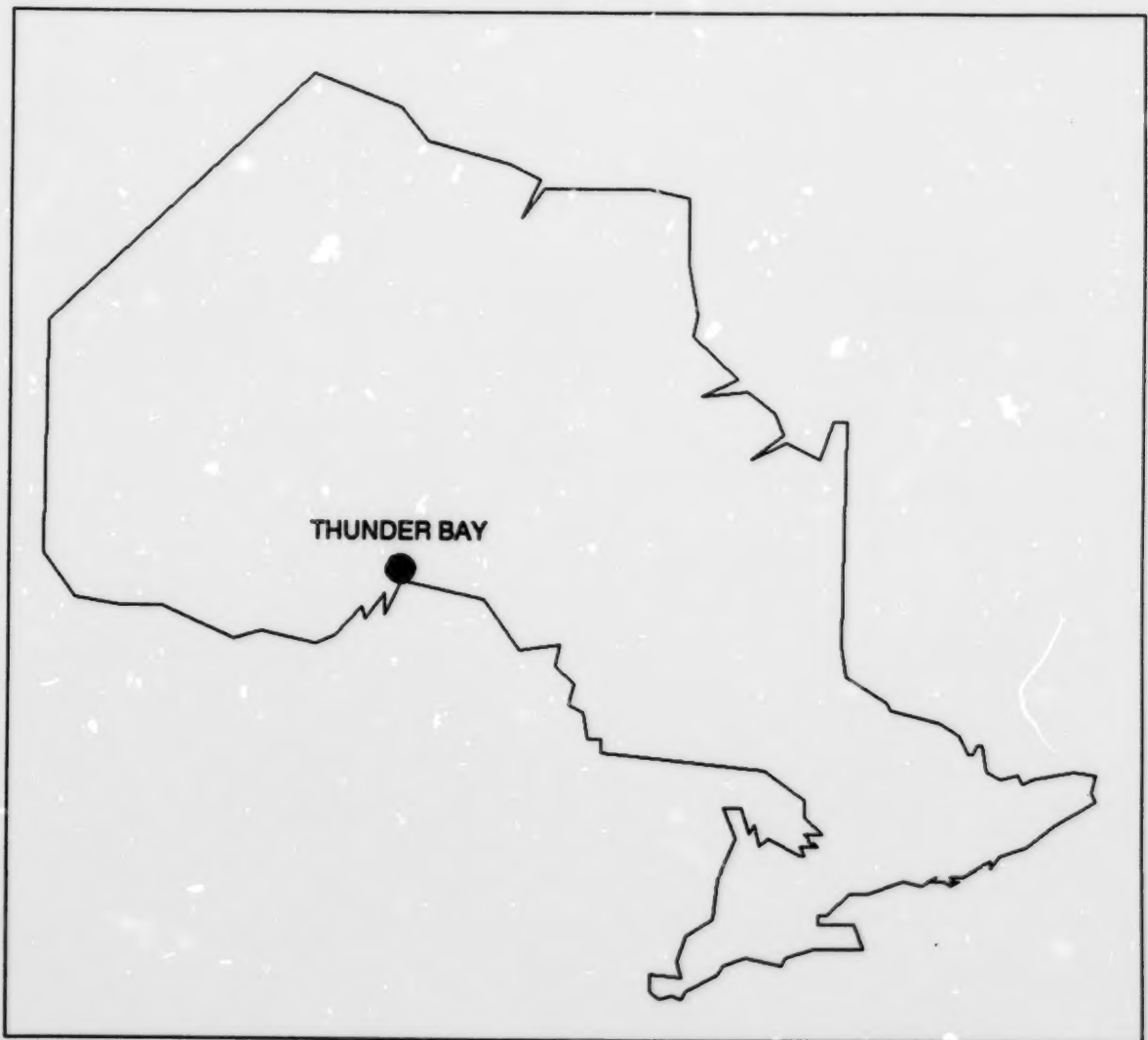


FIGURE 2
THUNDER BAY (BARE POINT) WATER TREATMENT PLANT

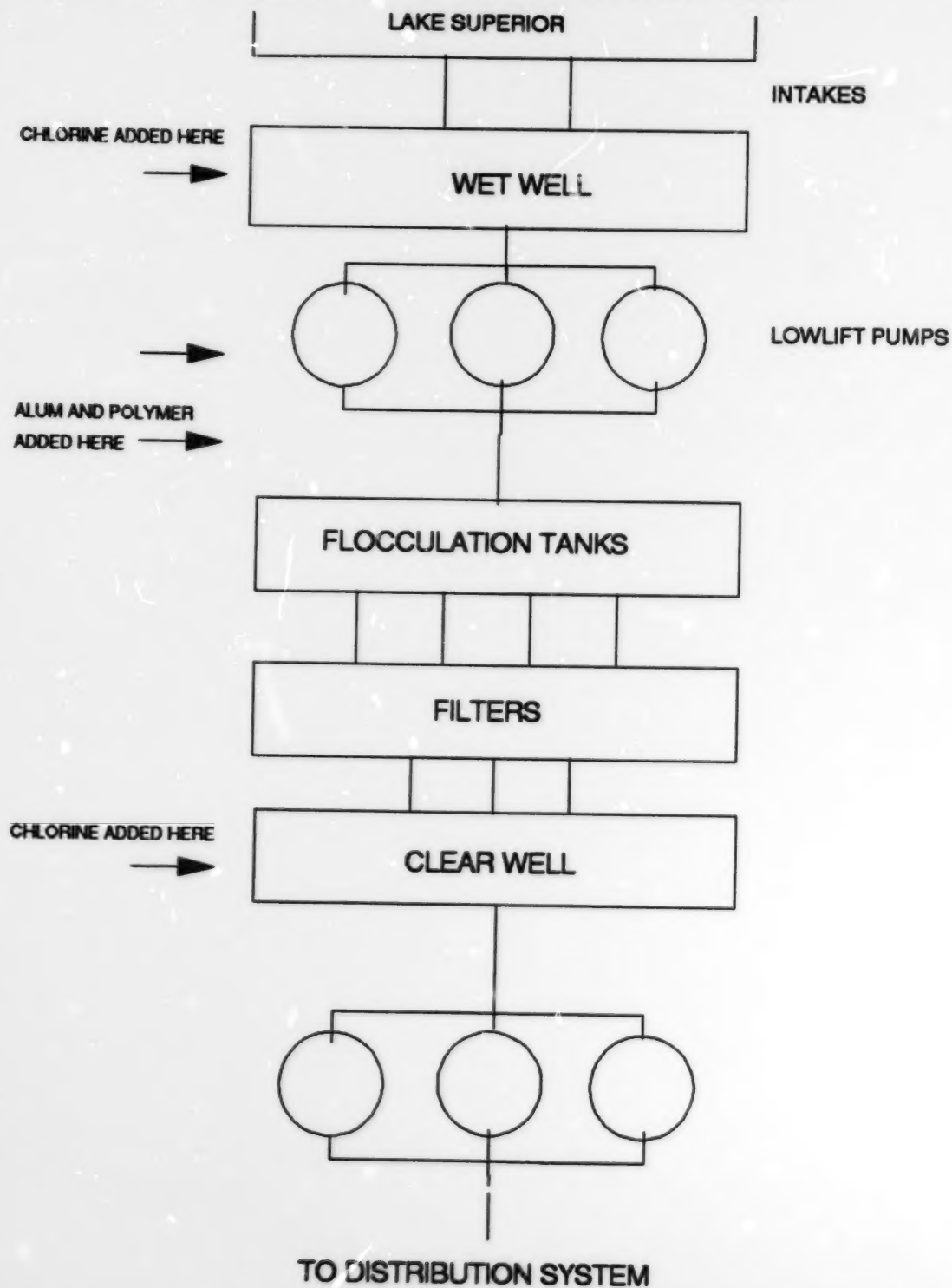


TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

THUNDER BAY (BARE POINT) WATER TREATMENT PLANT

<u>LOCATION:</u>	500 DONALD STREET EAST THUNDER BAY, ONTARIO P7E 5V3 (807-475-1305)
<u>SOURCE:</u>	RAW WATER SOURCE - LAKE SUPERIOR
<u>RATED CAPACITY:</u>	70.46 (1000 M ³ /DAY)
<u>OPERATION:</u>	MUNICIPAL
<u>PLANT SUPERINTENDENT:</u>	R. ROMANICK
<u>MINISTRY REGION:</u>	NORTHWEST
<u>DISTRICT OFFICER:</u>	D. MURRAY

<u>MUNICIPALITY SERVED</u>	<u>POPULATION</u>
THUNDER BAY	113,000

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At the distribution system sites two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for minimum of six hours. These samples are used to make an assessment of the amount by which the levels of inorganic compounds and metals may be changed on standing due to leaching from (or deposition on) the plumbing system. The only analyses carried out on the standing samples therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing at the sample tap for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (Appendix B).

Sample day flow, treatment chemical dosages and Field Chemistry measurements such as Turbidity, Chlorine Residuals, pH and Temperature were recorded on the day of sampling and were entered on the DWSP data base as submitted.

RESULTS

Two locations in the distribution system were sampled beginning in May; the raw and treated water at the plant was sampled beginning in September. The Thunder Bay (Bare Point) Water Treatment Plant was sampled for approximately 160 parameters on a monthly basis. Sampling at the Site 1 location was discontinued in September and a new location was selected where sampling began in November. Distribution system samples were not taken on October and no samples were taken in August.

The Specific Pesticides and Chlorophenols scans were sampled in November only. Polynuclear Aromatic Hydrocarbons and Phenolics were only analysed in the raw and treated water at the plant.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analysed in the DWSP.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN

0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently published (ISBN 0-7729-4461-X) by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

Although some of the parameters measured on DWSP may be present in the raw and treated water as a result of pollution, many of the compounds detected are naturally occurring or are treatment by-products.

Plant operational personnel address occurrences of taste and odour or biological water quality parameters. The DWSP does not assess these aspects of the water supply.

As stated under Results, traces do not indicate quantifiable values, as defined by established MOE Laboratory analytical reporting protocols. The occasional finding of a trace level of a contaminant is thus not considered to be significant. They can be useful in trend analysis, or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels.

DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.

Bacteriology

Positive results for the Bacteriology scan were present once in the treated water, twice in the Site 1 water, once in the Site 2 water and twice in the Site 3 water. The positive parameters were Standard Plate Count and Total Coliform Background.

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality; the routine monitoring program usually requires the taking of multiple samples in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Further, bacteriological limits were developed in acknowledgement that the presence of coliforms may be detected due to their non-uniform distribution throughout the distribution system and the fact that their enumeration is subject to considerable variation. Routine bacteriological monitoring, as outlined in the ODWOs is carried out by the operating authority.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The results for Laboratory and Field Chemistry scans were below any applicable health related ODWOs.

The Langelier Index is used extensively in estimating the corrosion

potential of water. An increasingly negative index indicates the increasing possibility of corrosion. It is considered sound engineering practice to maintain a slightly positive Langelier Index. The Langelier Index for Bare Point is consistently negative.

Metals

The results reported for the Metal scan were below any applicable ODWOs.

Elevated levels of Copper, Nickel, Lead and Zinc were detected in the standing samples as compared to the free flow distribution samples, indicating that these metals were leached from the household plumbing as the water stood overnight. The negative Langelier Index indicates potential for corrosion and some metals will be leached in standing samples.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of residual Aluminum in the treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as Al in the water leaving the plant to avoid problems in the distribution system.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that no chloroaromatics were detected.

Chlorophenols

The results of the Chlorophenol scan showed that one Chlorophenol was detected:

2,4,6-Trichlorophenol

2,4,6-Trichlorophenol was detected at a trace level, in one treated water sample.

Pesticides and PCB

Results of the Pesticides and PCB scan showed that no PCBs were detected and that two pesticides were detected:

Alpha BHC

Lindane

There are several isomers of BHC (benzene hexachloride); gamma BHC is the active ingredient of the pesticide Lindane, while alpha BHC is the isomer most predominantly found in surface waters of the Great Lakes basin as indicated by results from other water supplies on DWSP.

Alpha BHC was detected at trace levels, in four raw water samples, three treated water samples, four Site 1, two Site 2 and four Site 3 samples.

Lindane was detected at trace levels, twice in the raw water, twice in the treated water, three times in the Site 1, once in the Site 2 and twice in the Site 3 water samples.

Specific Pesticides

The results of the Specific Pesticide scan showed that none were detected.

Phenolics

Phenolics were detected three times in both the raw water and the treated water at 1.8 ug/L and 1.0 ug/L in October, 5.6 ug/L and 3.0 ug/L in November and 1.0 ug/L and 1.6 ug/L in December respectively. The maximum desirable concentration of phenolic substances in drinking water is 2.0 ug/L. This limit has been set primarily to prevent the occurrence of undesirable tastes and odours, particularly in chlorinated water. Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes.

Polynuclear Aromatic Hydrocarbons (PAH)

The results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatile scan showed that five parameters, other than Trihalomethanes (THMs) were detected:

Toluene

Ethylbenzene

Meta-Xylene

Ortho-Xylene

Styrene

Toluene was detected at trace levels, once in the raw water, once in the treated water and Site 1 and 2 waters and twice in the Site 3 water. The detection of toluene at low, trace levels is a laboratory artifact derived from the analytical methodology. The purge-and-trap analytical technique depends on the purging of the volatile organics in the water sample with helium gas onto a Tenax trapping column. The volatile materials are subsequently thermally desorbed, separated and quantified. Tenax, a toluene-like polymeric material, tends to decompose sporadically upon heating into toluene and other aromatic components (ethylbenzene and xylene) giving instrument blanks in the order of 0.05 ug/L.

The detected trace levels of Styrene are also considered to be laboratory artifacts due to the outgassing of monomeric styrene from the polystyrene shipping containers. The sporadic background levels from this source are in the order of 0.05 ug/L.

Ethylbenzene was detected at trace levels, three times in the raw water and treated water, once in the Site 1 and 2 samples and in four samples at Site 3.

Meta-Xylene (M-Xylene) was detected at trace levels, once in the Site 1 and Site 3 samples.

Ortho-Xylene (O-Xylene) was detected at trace levels, once in the treated water, once in the Site 1 sample and twice in the Site 3 sample.

The volatiles listed above are typically found on an occasional basis at other water supplies included on the DWSP, usually at trace levels.

THMs are known to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and Total THMs were detected in all treated waters. Bromoform was not detected. All Total THM occurrences, ranging from 33.45 ug/L to 67.65 ug/L were well below the ODWO of 350 ug/L.

CONCLUSIONS

The Thunder Bay (Bare Point) Water Treatment Plant for the sample year of 1988 produced good quality water at the plant and this was maintained in the distribution system.

No health related guidelines, for organic or inorganic parameters, were exceeded during 1988.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) SAMPLE DAY CONDITIONS 1986

SAMPLE DAY CONDITIONS

TREATMENT CHEMICAL DOSAGES (MG/L)

DATE	RETENTION TIME(HRS)	FLOW (1000 M3)	PRE-CHLORINATION		COAGULATION		COAGULATION AID		POST-CHLORINATION	
			CHLORINE		ALUM LIQUID		POLYELECTROLYTE		CHLORINE	
MAY 10	.	.	01.45		05.55		00.18		00.25	
JUN 14	.	.	01.14		05.05		00.23		00.39	
JUL 12	.	47.2	01.39		05.30		00.25		00.46	
SEP 13	.3	35.8	01.45		05.05		00.17		00.47	
OCT 18	.1	39.3	01.70		07.05		00.20		00.57	
NOV 15	.2	29.5	01.76		07.30		00.18		00.60	
DEC 13	.	.	01.01		05.55		00.18		00.30	

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP)

SUMMARY TABLE OF RESULTS (1988)

SCAM	PARAMETER	RAW		TREATED		SITE 1		SITE 2		SITE 3	
		TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE
BACTERIOLOGICAL	FECAL COLIFORM MF	3	0	0	.	.	.	.	.	.	.
	FECAL COLIFORM	.	.	1	0	0	.	.	1	0	0
	FECAL STREPTO MF	1	0	0	.	.	.	.	.	.	.
	STANDARD PLATE CNT MF	.	.	3	1	0	4	1	0	5	2
	P/A BOTTLE	.	.	.	.	.	3	0	0	.	3
	COLIFORM	.	.	1	0	0	.	.	1	0	0
	TOTAL COLIFORM MF	3	1	0	3	0	0	4	0	0	5
	T COLIFORM BCKGRD MF	2	1	0	2	0	0	4	1	0	4
	*TOTAL SCAN BACTERIOLOGICAL	9	2	0	10	1	0	15	2	0	4
	*TOTAL GROUP BACTERIOLOGICAL	9	2	0	10	1	0	15	2	0	4
CHEMISTRY (FLD)	FLD CHLORINE (CONB)	.	.	4	4	0	8	0	2	0	12
	FLD CHLORINE FREE	.	.	4	4	0	8	0	4	0	12
	FLD CHLORINE (TOTAL)	.	.	4	4	0	8	0	4	0	12
	FLD PH	4	4	0	4	0	8	0	4	0	12
	FLD TEMPERATURE	4	4	0	4	0	8	0	4	0	12
	FLD TURBIDITY	4	4	0	4	0	8	0	4	0	12
*TOTAL SCAN CHEMISTRY (FLD)	12	12	0	24	0	40	0	18	0	60	
CHEMISTRY (LAB)	ALKALINITY	4	4	0	4	0	8	0	4	0	12
	CALCIUM	4	4	0	4	0	8	0	4	0	12

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM TUNDRA BAY (BARE POINT UTP)

SUMMARY TABLE OF RESULTS (1988)

SCAN	PARAMETER	SITE 1			SITE 2			SITE 3				
		TOTAL POSITIVE	TRACE	TREATED	TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE	TOTAL POSITIVE	TRACE		
CHEMISTRY (LAB)												
	CYANIDE	4	0	0	4	0	0	0	0	6	0	0
	CHLORIDE	3	2	1	4	4	0	8	0	4	0	12
	COLOR	4	3	1	4	0	3	8	0	8	2	1
	CONDUCTIVITY	4	4	0	4	4	0	8	0	4	0	12
	FLUORIDE	4	0	4	4	0	3	8	0	8	1	3
	HARDNESS	4	4	0	4	4	0	8	0	4	0	12
	IONICAL	4	3	0	4	4	0	8	4	0	4	0
	LANGELIERS INDEX	0	0	0	0	0	0	2	0	0	0	2
	MAGNESIUM	4	4	0	4	4	0	8	0	4	0	12
	SODIUM	4	4	0	4	4	0	8	7	1	4	0
	AMMONIUM TOTAL	4	3	1	4	3	1	8	5	3	4	1
	NITRITE	4	2	2	4	1	0	8	2	6	4	0
	TOTAL NITRATES	4	4	0	4	4	0	8	0	4	0	12
	NITROGEN TOT KJELD	3	3	0	4	1	3	8	6	2	4	2
	PH	4	4	0	4	4	0	8	8	0	4	0
	PHOSPHORUS FIL REACT	4	0	4	4	0	4	-	-	-	-	-
	PHOSPHORUS TOTAL	3	0	3	4	0	3	-	-	-	-	-
	SULPHATE	4	3	0	4	4	0	4	4	0	4	0
	TURBIDITY	4	4	0	4	2	2	8	7	1	4	0
*TOTAL SCAN CHEMISTRY (LAB)		77	55	16	80	51	19	138	101	29	70	54

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BAKE POINT WTP)

SUMMARY TABLE OF RESULTS (1988)

SCAN	PARAMETER	SITE		TREATED		SITE 1		SITE 2		SITE 3	
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL
METALS	ARSENIC	4	0	4	0	4	0	5	4	0	10
	BARIUM	4	4	4	4	8	8	0	4	0	12
	BORON	4	1	3	4	8	0	8	4	2	12
	BERYLLIUM	4	0	4	0	3	8	0	4	0	11
	CADMIUM	4	0	4	0	3	8	0	4	0	4
	COBALT	4	0	4	0	1	8	0	4	0	2
	CHROMIUM	4	0	4	0	4	8	0	4	0	12
	COPPER	4	2	2	4	3	8	5	4	3	10
	IRON	4	1	2	4	0	8	0	4	0	12
	MERCURY	4	0	2	4	0	1	7	4	1	9
	MANGANESE	4	3	1	4	0	8	0	4	0	12
	MOLYBDENUM	4	0	4	0	4	8	0	4	0	12
	NICKEL	4	0	2	4	0	8	0	4	0	6
	LEAD	4	0	3	4	0	8	0	4	0	11
	ANTHONY	4	3	1	4	3	8	2	4	3	7
	SELENIUM	4	0	2	4	0	8	0	4	0	7
	STRONTIUM	4	4	0	4	0	8	0	4	0	12
	TITANIUM	4	4	0	4	3	8	4	4	0	8
	THALLIUM	4	0	2	4	0	1	8	0	1	1
	URANIUM	4	0	3	4	0	8	0	4	0	6
	VANADIUM	4	1	3	4	4	8	0	4	0	11
	ZINC	4	1	3	4	0	8	7	4	1	7
*TOTAL SCAN METALS		96	32	44	96	32	188	66	94	35	282
*TOTAL GROUP INORGANIC & PHYSICAL		185	99	60	200	107	366	207	182	48	550

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP)

SUMMARY TABLE OF RESULTS (1988)

SCAM	PARAMETER	SITE		RAU		TREATED		SITE 1		SITE 2		SITE 3	
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROBROMATICS	HEXACHLOROBUTADIENE	4	0	0	4	0	0	4	0	0	2	0	0
	123 TRICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	1234 T-CHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	1235 T-CHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	124 TRICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	1245 T-CHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	135 TRICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	HCB	4	0	0	4	0	0	4	0	0	2	0	0
	HEXACHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0
	OCTACHLOROSTYRENE	4	0	0	4	0	0	4	0	0	2	0	0
	PENTACHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0
	236 TRICHLOROTOLUENE	4	0	0	4	0	0	4	0	0	2	0	0
	245 TRICHLOROTOLUENE	4	0	0	4	0	0	4	0	0	2	0	0
	26A TRICHLOROTOLUENE	4	0	0	4	0	0	4	0	0	2	0	0
*TOTAL SCAM CHLOROBROMATICS		56	0	0	56	0	0	56	0	0	28	0	0
CHLOROPHENOLS	234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2356 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	246-TRICHLOROPHENOL	1	0	0	1	0	1	.	.	.	.	.	.
	PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAM CHLOROPHENOLS		6	0	0	6	0	1	0	0	0	0	0	0

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BASE POINT VTP)

SUMMARY TABLE OF RESULTS (1988)

SCAM	PARAMETER	SITE		RAU		TREATED		SITE 1		SITE 2		SITE 3	
		TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE
PAH	PHENANTHRENE	4	0	0	4	0	0						
	ANTHRACENE	4	0	0	4	0	0						
	FLUORANTHRENE	4	0	0	4	0	0						
	PYRENE	4	0	0	4	0	0						
	BENZO(A)ANTHRACENE	4	0	0	4	0	0						
	CHRYSENE	4	0	0	4	0	0						
	DIMETH. BENZ(A)ANTHR	4	0	0	4	0	0						
	BENZO(E) PYRENE	4	0	0	4	0	0						
	BENZO(J) FLUORANTHENE	0	0	0	0	0	0						
	BENZO(B) FLUORANTHENE	4	0	0	4	0	0						
	PERYLENE	4	0	0	4	0	0						
	BENZO(K) FLUORANTHENE	4	0	0	4	0	0						
	BENZO(A) PYRENE	4	0	0	4	0	0						
	BENZO(G,H,I) PERYLENE	4	0	0	4	0	0						
	DIBENZO(A,H) ANTHRAC	4	0	0	4	0	0						
	INDENO(1,2,3-C,D) PY	4	0	0	4	0	0						
	BENZO(B) CHRYSENE	4	0	0	4	0	0						
	ANTHANTHRENE	0	0	0	0	0	0						
	CORONENE	4	0	0	4	0	0						
	*TOTAL SCAM PAH	68	0	0	68	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALDRIN	4	0	0	4	0	0	4	0	0	2	0	0
	ALPHA BHC	4	0	4	4	0	3	4	0	4	2	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP)

SUMMARY TABLE OF RESULTS (1988)

SCAM	PARAMETER	SITE		TREATED		SITE 1		SITE 2		SITE 3		
		TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	TOTAL	POSITIVE TRACE	
PESTICIDES & PCB	BETA BHC	4	0	0	0	4	0	0	2	0	6	0
	LINDANE	4	0	2	0	4	0	3	2	0	6	2
	ALPHA CHLORDANE	4	0	0	0	4	0	0	2	0	6	0
	GAMMA CHLORDANE	4	0	0	0	4	0	0	2	0	6	0
	DIELDRIN	4	0	0	0	4	0	0	2	0	6	0
	METHOXYCHLOR	4	0	0	0	4	0	0	2	0	6	0
	ENDOSULFAM I	4	0	0	0	4	0	0	2	0	6	0
	ENDOSULFAM II	4	0	0	0	4	0	0	2	0	6	0
	ENDRIN	4	0	0	0	4	0	0	2	0	6	0
	ENDOSULFAM SULPHATE	4	0	0	0	4	0	0	2	0	6	0
	HEPTACHLOR EPOXIDE	4	0	0	0	4	0	0	2	0	6	0
	HEPTACHLOR	4	0	0	0	4	0	0	2	0	6	0
	MIREX	4	0	0	0	4	0	0	2	0	6	0
	OXYCHLORDANE	4	0	0	0	4	0	0	2	0	6	0
	OPDDT	4	0	0	0	4	0	0	2	0	6	0
	PCB	4	0	0	0	4	0	0	2	0	6	0
	DDO	4	0	0	0	4	0	0	2	0	6	0
	PPDDE	4	0	0	0	4	0	0	2	0	6	0
	PPDDT	4	0	0	0	4	0	0	2	0	6	0
	AMETRIINE	4	0	0	0	4	0	0	2	0	6	0
	ATRAZINE	4	0	0	0	4	0	0	2	0	6	0
	ATRATONE	4	0	0	0	4	0	0	2	0	6	0
CYANAZINE	4	0	0	0	4	0	0	2	0	6	0	
DES ETHYL ATRAZINE	4	0	0	0	4	0	0	2	0	6	0	
DES ETHYL SINAZINE	4	0	0	0	4	2	0	2	0	4	4	

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP)

SUMMARY TABLE OF RESULTS (1988)

[illegible]

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BASE POINT WTP)

SUMMARY TABLE OF RESULTS (1968)

SCAN	PARAMETER	SITE		TREATED	SITE 1		SITE 2		SITE 3				
		TOTAL	POSITIVE		TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE		
SPECIFIC PESTICIDES	DICHLOROS	1	0	0	1	0	0	1	0	0	1	0	0
	CHLORPYRIFOS	1	0	0	1	0	0	1	0	0	1	0	0
	ETHION	1	0	0	1	0	0	1	0	0	1	0	0
	AZINPHOS-METHYL	0	0	0	0	0	0	0	0	0	0	0	0
	MALATHION	1	0	0	1	0	0	1	0	0	1	0	0
	MEVINPHOS	1	0	0	1	0	0	1	0	0	1	0	0
	METHYL PARATHION	1	0	0	1	0	0	1	0	0	1	0	0
	METHYLTRITHION	1	0	0	1	0	0	1	0	0	1	0	0
	PARATHION	1	0	0	1	0	0	1	0	0	1	0	0
	PHOSPHATE	1	0	0	1	0	0	1	0	0	1	0	0
	RELDAN	1	0	0	1	0	0	1	0	0	1	0	0
	RONNEL	1	0	0	1	0	0	1	0	0	1	0	0
	AMINOCARB	0	0	0	0	0	0	0	0	0	0	0	0
	BENONYL	1	0	0	1	0	0	1	0	0	1	0	0
	BUX	1	0	0	1	0	0	1	0	0	1	0	0
	CARBOFURAN	1	0	0	1	0	0	1	0	0	1	0	0
	CICP	1	0	0	1	0	0	1	0	0	1	0	0
	DIALATE	1	0	0	1	0	0	1	0	0	1	0	0
	EPTAM	1	0	0	1	0	0	1	0	0	1	0	0
	IPC	1	0	0	1	0	0	1	0	0	1	0	0
	PROPOXUR	1	0	0	1	0	0	1	0	0	1	0	0
	CARBARYL	1	0	0	1	0	0	1	0	0	1	0	0
	BUTYLATE	1	0	0	1	0	0	1	0	0	1	0	0
TOTAL SCAN SPECIFIC PESTICIDES		26	0	0	26	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT VTP)

SUMMARY TABLE OF RESULTS (1988)

SCAN	PARAMETER	SITE			TREATED			SITE 1			SITE 2			SITE 3		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES	BENZENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	TOLUENE	4	0	1	4	0	1	4	0	1	2	0	1	6	0	2
	ETHYLBENZENE	4	0	3	4	0	3	4	0	1	2	0	1	6	0	4
	P-XYLENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	M-XYLENE	4	0	0	4	0	1	4	0	1	2	0	0	6	0	1
	O-XYLENE	4	0	0	4	0	1	4	0	1	2	0	0	6	0	2
	STYRENE	3	1	1	3	0	1	4	0	1	2	0	1	2	0	1
	1,1 DICHLOROETHYLENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	METHYLENE CHLORIDE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,1,2-DICHLOROETHYLENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,1 DICHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	CHLOROFORM	4	0	2	4	4	0	4	4	0	2	2	0	6	6	0
	111, TRICHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,2 DICHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	CARBON TETRACHLORIDE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,2 DICHLOROPROPANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	TRICHLOROETHYLENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	DICHLOROBROMOETHANE	4	0	0	4	4	0	4	4	0	2	2	0	6	6	0
	112 TRICHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	CHLORODIBROMOETHANE	4	0	0	4	0	4	4	1	3	2	0	2	6	1	5
	T-CHLOROETHYLENE	4	0	0	4	0	0	3	0	0	2	0	0	5	0	0
	BROMOFORM	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1122 1-CHLOROETHANE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	CHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,4 DICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BASE POINT MTP)

SUMMARY TABLE OF RESULTS (1985)

SCAM	PARAMETER	SITE			TREATED			SITE 1			SITE 2			SITE 3		
		RAW		TOTAL POSITIVE TRACE	TOTAL POSITIVE TRACE		TOTAL POSITIVE TRACE	TOTAL POSITIVE TRACE		TOTAL POSITIVE TRACE	TOTAL POSITIVE TRACE		TOTAL POSITIVE TRACE	TOTAL POSITIVE TRACE		TOTAL POSITIVE TRACE
VOLATILES	1,3 DICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	1,2 DICHLOROBENZENE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	TRIFLUOROCHLOROTOLUENE	-	-	-	-	-	-	2	0	0	-	-	-	2	0	0
	ETHYLENE DIBROMIDE	4	0	0	4	0	0	4	0	0	2	0	0	6	0	0
	TOTL TRINALOETHANES	4	0	0	4	4	0	4	4	0	2	2	0	6	6	0
*TOTAL SCAM VOLATILES		115	1	7	115	12	11	113	13	7	58	6	5	171	19	15
*TOTAL GROUP ORGANIC		413	4	13	400	15	17	301	13	14	154	6	8	455	19	21
TOTAL		607	105	73	610	123	71	682	222	123	340	119	56	1024	331	190

KEY TO TABLE 5 and 6

- A** **ONTARIO DRINKING WATER OBJECTIVES (ODWO)**
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
1*. MAC for Bacteriological Analyses
 Poor water quality is indicated when :
 - total coliform counts > 0 < 5
 - P/A Bottle Test is present after 48 hours
 - Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
 - Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
 - Standard Plate Count should not exceed 500 organisms per ml at 35 °C within 48 hours
2. Interim Maximum Acceptable Concentration (IMAC)
3. Maximum Desirable Concentration (MDC)
4. Aesthetic or Recommended Operational Guideline
 - hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness >200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.
- B** **HEALTH & WELFARE CANADA (H&W)**
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO) (for xylenes, the AO is a total)
- C** **WORLD HEALTH ORGANIZATION (WHO)**
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D** **US ENVIRONMENTAL PROTECTION AGENCY (EPA)**
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
- F** **EUROPEAN ECONOMIC COMMUNITY (EEC)**
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)
- G** **CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE**
- H** **USSR MAXIMUM PERMISSIBLE CONCENTRATION**
- I** **NEW YORK STATE AMBIENT WATER GUIDELINE**
- N/A** **NONE AVAILABLE**

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
RAW	TREATED	SITE 1	SITE 2	SITE 3		
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)		
SEP	0	.	.	.	.	.
OCT	0 T48	.	.	.	.	.
NOV	BDL	.	.	.	.	.
FECAL COLIFORM (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0 (A1)		
NOV	.	0	.	.	0	0
STANDARD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A1)		
MAY	.	.	2	.	.	1
JUN	.	.	0	.	.	1
JUL	.	.	0	.	.	0
SEP	3 <=	.	0	.	.	0 <=
OCT	1 <=	.	.	.	.	.
NOV	9	.	.	2	.	0
P/A BOTTLE (0=ABSENT)		DET'N LIMIT = 0		GUIDELINE = 0 (A1*)		
MAY	.	.	0	.	.	0
JUN	.	.	0	.	.	0
JUL	.	.	0	.	.	0
COLIFORM (0=ABSENT)		DET'N LIMIT = N/A		GUIDELINE = 0 (A1)		
NOV	.	0	.	.	0	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM						
SITE TYPE		RAW	TREATED	SITE 1		SITE 2		SITE 3	
				STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
TOTAL COLIFORM NF (CT/100ML)				GUIDELINE = 5/100ML(A1)					
				DET'N LIMIT = 0					
MAY		.	.	.	0	.	.	.	0
JUN		.	.	.	0	.	.	.	0
JUL		.	.	.	0	.	.	.	0
SEP		0	0 T48	.	0	.	.	.	0 T48
OCT		1460 A3C	0 T48	.	.	.	.	.	.
NOV		BDL	0	.	.	.	0	.	0
T COLIFORM BCKGRD NF (CT/100ML)				GUIDELINE = N/A					
				DET'N LIMIT = 0					
MAY		.	.	.	1	.	.	.	0
JUN		.	.	.	0	.	.	.	0
JUL		.	.	.	0	.	.	.	0
SEP		0	0 T48	.	0	.	.	.	0
OCT		20200 A3C	0 T48	.	.	.	.	.	0 T48

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING
CHEMISTRY (FLD)							
FLD CHLORINE (CONC) (MG/L)			DET'N LIMIT = N/A		GUIDELINE = N/A		
MAY	.	.	.100	.100	.	.	.100
JUN	.	.	.100	.200	.	.	.100
JUL	.	.	.100	.100	.	.	.100
SEP	.	.080	.100	.200	.	.	.100
OCT	.	.070	.	.	.	.	.
NOV	.	.080	.	.	.400	.200	.200
DEC	.	1.500	.	.	.	.050	.100
FLD CHLORINE FREE (MG/L)							
			DET'N LIMIT = N/A		GUIDELINE = N/A		
MAY	.	.	.800	.900	.	1.100	1.100
JUN	.	.	1.000	.500	.	.600	.800
JUL	.	.	.300	.700	.	.900	1.100
SEP	.	1.330	.100	.300	.	.700	1.100
OCT	.	1.240	.	.	.	.	.
NOV	.	1.370	.	.	.100	.300	.700
DEC	.	1.500	.	.	.300	1.100	1.300
FLD CHLORINE (TOTAL) (MG/L)							
			DET'N LIMIT = N/A		GUIDELINE = N/A		
MAY	.	.	1.100	1.100	.	1.100	1.200
JUN	.	.	1.100	.700	.	.700	.900
JUL	.	.	.400	1.100	.	1.100	1.300
SEP	.	1.440	.200	.500	.	.800	1.200
OCT	.	1.310	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM				
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	.	1.450	.	.	.500	.500	.900	.900
DEC	.	1.500	.	.	.500	1.100	1.250	1.500
FLD PH (DMS/LESS)			DET'N LIMIT = N/A					
			GUIDELINE = 6.5-8.5(A4)					
MAY	.	.	7.400	7.400	.	.	7.400	7.100
JUN	.	.	7.500	7.400	.	.	7.300	7.400
JUL	.	.	7.600	7.600	.	.	7.200	7.400
SEP	7.500	6.900	7.400	7.300	.	.	7.300	7.400
OCT	7.680	7.200	.	.	.	.	.	.
NOV	7.600	7.000	.	.	7.400	7.200	7.200	7.200
DEC	7.500	7.200	.	.	7.400	7.600	7.400	7.200
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A					
			GUIDELINE = 15 (A1)					
MAY	.	.	10.700	5.000	.	.	10.500	5.000
JUN	.	.	13.000	10.000	.	.	12.000	9.500
JUL	.	.	15.000	11.500	.	.	14.000	12.500
SEP	12.000	12.000	17.500	14.000	.	.	17.000	14.000
OCT	14.000	14.000	.	.	.	.	.	.
NOV	9.000	9.000	.	.	11.000	8.000	14.000	11.000
DEC	9.000	5.000	.	.	12.500	5.500	10.000	8.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A					
			GUIDELINE = 1.0 (A1)					
SEP	.760	.100	.	.	.	.	.	.
OCT	.600	.050	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	.620	.100	.	.	.	.	.	.
DEC	.470	.100	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)			GUIDELINE = 30-500 (A4)					
ALKALINITY (MG/L)			DET'M LIMIT = .200					
MAY	.	.	40,600	40,400	.	.	42,500	41,100
JUN	.	.	42,600	41,300	.	.	40,800	41,300
JUL	.	.	41,900	39,900	.	.	40,900	40,400
SEP	45,800	40,300	42,200	41,600	.	.	41,500	41,900
OCT	44,900	38,900	.	.	.	.	.	.
NOV	46,100	37,500	.	.	40,500	40,600	39,500	39,100
DEC	46,300	39,800	.	.	41,000	42,000	40,500	41,000
CALCIUM (MG/L)			GUIDELINE = 100 (F2)					
MAY	.	.	14,000	13,800	.	.	13,800	13,400
JUN	.	.	15,000	14,800	.	.	15,000	15,000
JUL	.	.	15,200	15,600	.	.	15,600	15,600
SEP	15,200	14,400	15,000	14,600	.	.	15,400	15,400
OCT	14,200	14,600	.	.	.	.	.	.
NOV	15,600	15,400	.	.	16,200	16,000	16,400	15,800
DEC	14,600	13,800	.	.	15,000	15,000	15,000	14,800
CHLORIDE (MG/L)			GUIDELINE = 250 (A3)					
MAY	.	.	3,600	3,400	.	.	3,700	3,300
JUN	.	.	3,400	3,100	.	.	3,200	3,000
JUL	.	.	3,700	3,500	.	.	3,600	3,600
SEP	.900 <T	3,100	3,600	3,100	.	.	3,100	3,100
OCT	1,600	2,800	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM TIMBER BAY (BARE POINT WTP) 1995

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1	SITE 2	SITE 3		
			STANDING	STANDING	STANDING	FREE FLOW	FREE FLOW
NOV	115	3,700	.	4,400	3,900	4,400	4,200
DEC	1,800	3,600	.	3,900	3,700	3,300	3,200
COLOUR (TCU)							
			DET'M LIMIT = .5	GUIDELINE = 5.0 (A3)			
MAY	.	.	1,000 <T	.500 <T	.500 <T	.	.500 <T
JUN	.	.	1,000 <T	1,000 <T	1,000 <T	.	.500 <T
JUL	.	.	.500 <T	.500 <T	.500 <T	.	.500 <T
SEP	2,500	.500 <T	.500 <T	2,000 <T	BDL	.	.500 <T
OCT	3,500	.500 <T	.	.	.	.	.
NOV	3,500	1,000 <T	.	3,500	1,500 <T	4,000	2,500
DEC	2,000 <T	BDL	.	1,000 <T	.500 <T	BDL	BDL
CONDUCTIVITY (UMHO/CM)			DET'M LIMIT = 1	GUIDELINE = 400 (F2)			
MAY	.	.	108	105	106	.	105
JUN	.	.	109	107	108	.	108
JUL	.	.	111	112	111	.	111
SEP	102	106	109	106	108	.	107
OCT	101	107	.	.	.	.	.
NOV	107	112	.	118	114	118	115
DEC	103	107	.	108	107	109	107
FLUORIDE (MG/L)			DET'M LIMIT = .01	GUIDELINE = 2.400 (A1)			
MAY	.	.	.030 <T	.030 <T	.030 <T	.	.040 <T
JUN	.	.	.040 <T	.030 <T	.040 <T	.	.030 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUL			.040 <T	.030 <T			.030 <T	.030 <T
SEP	.020 <T	.020 <T	.020 <T	.020 <T			.020 <T	.020 <T
OCT	.040 <T	.040 <T						
NOV	.040 <T	.040 <T			.040 <T	.040 <T		.040 <T
DEC	.040 <T	NOL			.020 <T	.060	.040 <T	.040 <T
HARDNESS (MG/L)			DET'M LIMIT = .500			GUIDELINE = 80-100 (A4)		
MAY			45,000	44,000			45,000	43,000
JUN			48,000	48,000			48,000	49,000
JUL			51,000	52,000			52,000	52,000
SEP	50,000	48,000	50,000	49,000			51,000	51,000
OCT	48,000	47,000						
NOV	51,000	50,000			52,000	52,000	53,000	51,000
DEC	48,000	46,000			49,000	50,000	50,000	49,000
TOMICAL (CMH/SS)			DET'M LIMIT = N/A			GUIDELINE = N/A		
MAY			.000 MAF	.000 MAF			.000 MAF	.000 MAF
JUN			.000 MAF	.000 MAF			.000 MAF	.000 MAF
JUL			1.933	8.274			5.796	7.102
SEP	4.656	.836	1.973	1.378			3.081	1.791
OCT	2.218	1.953						
NOV	.000 MAF	2.964			.002	1.750	4.090	.632
DEC	2.499	5.844			1.678	2.433	.437	1.080
LANGELIER'S INDEX (CMH/SS)			DET'M LIMIT = N/A			GUIDELINE = N/A		

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	"	.796 MAF	.803 MAF	"	"	.652 MAF	.779 MAF
JUN	"	.706 MAF	.754 MAF	"	"	.754 MAF	.749 MAF
JUL	"	.758	.789	"	"	.678	.713
SEP	.666	.620	.807	"	"	.785	.751
OCT	.703	"	"	"	"	"	"
NOV	.404 MAF	.1.141	"	.859	.903	.952	.923
DEC	.579	.1.021	"	.922	.832	.707	.758
MAGNESIUM (MG/L)		DET'N LIMIT = .050		GUIDELINE = 30 (P2)			
MAY	"	2.400	2.400	"	"	2.500	2.400
JUN	"	2.600	2.600	"	"	2.600	2.800
JUL	"	3.100	3.200	"	"	3.200	3.200
SEP	3.000	3.000	3.000	"	"	3.100	3.000
OCT	2.900	"	"	"	"	"	"
NOV	2.800	"	"	2.900	2.800	2.900	2.800
DEC	2.900	"	"	2.800	2.900	3.000	2.900
SODIUM (MG/L)		DET'N LIMIT = .200		GUIDELINE = 200 (C3)			
MAY	"	.800 <T	1.200	"	"	1.400	.800 <T
JUN	"	2.000	1.800	"	"	1.800	2.000
JUL	"	2.400	2.400	"	"	2.400	2.400
SEP	1.800	1.600	1.600	"	"	1.600	1.600
OCT	1.400	"	"	"	"	"	"
NOV	2.000	"	"	2.200	2.200	1.800	2.000
DEC	1.600	"	"	1.600	1.600	1.800	1.600

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .05 (F2)			
MAY	.	.	.024	.022	.	.	.040	.014
JUN	.	.	.014	.006 <T	.	.	.010	.004 <T
JUL	.	.	.002 <T	.008 <T	.	.	.008 <T	.006 <T
SEP	.018	.028	.026	.016	.	.	.014	.016
OCT	.020	.004	.	.	.	.	.	.
NOV	.006 <T	.006 <T	.	.	.004 <T	.006 <T	.008 <T	.006 <T
DEC	.010	.010	.	.	.010	.008 <T	.010	.008 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)			
MAY	.	.	.002 <T	.002 <T	.	.	.003 <T	BDL
JUN	.	.	.001 <T	.001 <T	.	.	.001 <T	BDL
JUL	.	.	.001 <T	.001 <T	.	.	.001 <T	.001 <T
SEP	.007	.005	.008	.009	.	.	.006	.006
OCT	.008	BDL	.	.	.	.	.	.
NOV	.004 <T	BDL	.	.	.001 <T	.001 <T	.001 <T	.001 <T
DEC	.001 <T	BDL	.	.	.001 <T	.001 <T	.001 <T	BDL
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)			
MAY	.	.	.325	.325	.	.	.335	.310
JUN	.	.	.295	.285	.	.	.300	.295
JUL	.	.	.265	.255	.	.	.310	.255
SEP	.260	.250	.245	.235	.	.	.290	.240
OCT	.280	.275	.	.	.	.	.	.
NOV	.290	.310	.	.	.305	.300	.350	.310

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.300	.315	.	.305	.310	.350	.315
NITROGEN TOT KJELD (MG/L)		DET'M LIMIT = .020		GUIDELINE = N/A			
MAY	.	.160	.050 <T	.	.	.240	.050 <T
JUN	.	.130	.190	.	.	.120	.080 <T
JUL	.	.110	.090 <T	.	.	.180	.090 <T
SEP	.110	.160	.100	.	.	.150	.100
OCT	.160	.060 <T	.	.	.	.	.
NOV	.115	.130	.	.110	.120	.140	.120
DEC	.110	.070 <T	.	.070 <T	.060 <T	.080 <T	.070 <T
PH (DIMENSIONLESS)		DET'M LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
MAY	.	7.820	7.810	.	.	7.940	7.840
JUN	.	7.850	7.820	.	.	7.820	7.820
JUL	.	7.800	7.780	.	.	7.880	7.850
SEP	8.050	7.800	7.770	.	.	7.770	7.800
OCT	7.850	7.650	.	.	.	.	.
NOV	8.100	7.460	.	7.690	7.650	7.600	7.650
DEC	7.950	7.600	.	7.650	7.730	7.870	7.820
PHOSPHORUS FIL REACT (MG/L)		DET'M LIMIT = .0005		GUIDELINE = N/A			
SEP	.002 <T	.002 <T	.	.	.	.	.
OCT	.000 <T	.000 <T	.	.	.	.	.
NOV	.001 <T	.000 <T	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1968

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.001 <T	.001 <T	.	.	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = .002 GUIDELINE = .40 (F2)					
SEP	.004 <T	.003 <T	.	.	.	.	.	.
OCT	.008 <T	.004 <T	.	.	.	.	.	.
NOV	118	.002 <T	.	.	.	.	.	.
DEC	.002 <T	NOL	.	.	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200 GUIDELINE = 500. (A3)					
JUL	.	.	6.520	6.930	.	.	6.830	6.860
SEP	3.670	6.460	5.990	5.980	.	.	5.930	5.980
OCT	3.310	7.460	.	.	.	.	.	.
NOV	NOL	9.000	.	.	9.000	9.000	8.000	8.500
DEC	3.130	6.540	.	.	5.540	6.150	6.260	6.050
TURBIDITY (FTU)			DET'N LIMIT = .02 GUIDELINE = 1.00 (A1)					
MAY	.	.	.230	.070 <T	.	.	.370	.070 <T
JUN	.	.	.210	.170	.	.	.140	.060 <T
JUL	.	.	.730	.270	.	.	.530	.450
SEP	.480	.450	.770	.640	.	.	.400	.720
OCT	1.570	.480	.	.	.	.	.	.
NOV	.980	.170 <T	.	.	.440	.420	.210 <T	.450
DEC	.520	.100 <T	.	.	.260	.170	.270	.310

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1968

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING
METALS							
SILVER (UG/L)	DET'N LIMIT = .020 GUIDELINE = 50. (A1)						
MAY	.	.	BOL	BOL	.	.	BOL
JUN	.	.	BOL	.040 <T	.	.	.040 <T
JUL	.	.	BOL	BOL	.	.	BOL
SEP	BOL	BOL	BOL	BOL	.	.	BOL
OCT	BOL	BOL	.	.	.	.	.
NOV	BOL	BOL	.	.	BOL	.080 <T	.050 <T
DEC	BOL	BOL	.	.	BOL	BOL	.030 <T
ALUMINUM (UG/L)							
	DET'N LIMIT = .050 GUIDELINE = 100. (A4)						
MAY	.	.	15,000	14,000	.	.	17,000
JUN	.	.	25,000	32,000	.	.	32,000
JUL	.	.	24,000	63,000	.	.	53,000
SEP	9,800	50,000	30,000	48,000	.	.	49,000
OCT	21,000	19,000	.	.	.	.	.
NOV	18,000	23,000	.	.	96,000	130,000	110,000
DEC	6,100	15,000	.	.	16,000	16,000	17,000
ARSENIC (UG/L)							
	DET'N LIMIT = 0.050 GUIDELINE = 50.0 (A1)						
MAY	.	.	BOL	BOL	.	.	BOL
JUN	.	.	.300 <T	.360 <T	.	.	.350 <T
JUL	.	.	.270 <T	.410 <T	.	.	.460 <T
SEP	.440 <T	.420 <T	BOL	.110 <T	.	.	.080 <T
OCT	.620 <T	.100 <T	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DET'N LIMIT = 0.020 GUIDELINE = 1000. (A1)								
NOV	.540 <T	.110 <T	.	.	.240 <T	.300 <T	.170 <T	.170 <T
DEC	.530 <T	.250 <T	.	.	.250 <T	.160 <T	.120 <T	.200 <T
BARIUM (UG/L))								
MAY	.	.	9.900	9.600	.	.	9.500	9.500
JUN	.	.	11.000	10.000	.	.	10.000	10.000
JUL	.	.	7.600	11.000	.	.	11.000	11.000
SEP	12.000	12.000	12.000	12.000	.	.	12.000	11.000
OCT	13.000	9.700	.	.	.	.	.	.
NOV	10.000	10.000	.	.	11.000	11.000	11.000	11.000
DEC	10.000	10.000	.	.	11.000	10.000	9.900	10.000
BORON (UG/L))								
DET'N LIMIT = 0.200 GUIDELINE = 5000. (A1)								
MAY	.	.	12.000 <T	5.800 <T	.	.	17.000 <T	5.700 <T
JUN	.	.	8.600 <T	8.400 <T	.	.	9.300 <T	6.200 <T
JUL	.	.	9.200 <T	7.700 <T	.	.	15.000 <T	8.200 <T
SEP	18.000 <T	25.000	9.800 <T	12.000 <T	.	.	11.000 <T	7.000 <T
OCT	12.000 <T	7.000 <T	.	.	.	.	.	.
NOV	42.000	22.000	.	.	36.000	40.000	10.000 <T	14.000 <T
DEC	19.000 <T	21.000	.	.	20.000 <T	8.000 <T	12.000 <T	23.000
BERYLLIUM (UG/L))								
DET'N LIMIT = 0.010 GUIDELINE = .20 (H)								
MAY	.	.	.030 <T	BDL	.	.	BDL	BDL
JUN	.	.	BDL	BDL	.	.	BDL	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	.	.	BDL	BDL	.	.	BDL	BDL
SEP	.070 <T	.020 <T	.040 <T	.170 <T	.	.	.040 <T	.070 <T
OCT	.020 <T	BDL	.	.	.	.	.	.
NOV	.040 <T	.020 <T	.	.	BDL	.050 <T	BDL	BDL
DEC	.090 <T	.100 <T	.	.	.100 <T	.080 <T	.120 <T	.100 <T
CADMIUM (UG/L)			DET'N LIMIT = 0.050		GUIDELINE = 5.000 (A1)			
MAY	.	.	BDL	.060 <T	.	.	.060 <T	BDL
JUN	.	.	BDL	BDL	.	.	BDL	BDL
JUL	.	.	BDL	BDL	.	.	BDL	BDL
SEP	BDL	.120 <T	.060 <T	.140 <T	.	.	.130 <T	BDL
OCT	BDL	BDL	.	.	.	.	.	.
NOV	BDL	BDL	.	.	BDL	BDL	BDL	BDL
DEC	BDL	BDL	.	.	BDL	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.020		GUIDELINE = 1000 (H)			
MAY	.	.	.050 <T	.040 <T	.	.	.060 <T	.050 <T
JUN	.	.	.070 <T	.060 <T	.	.	.090 <T	.070 <T
JUL	.	.	.030 <T	BDL	.	.	.030 <T	.030 <T
SEP	.100 <T	.060 <T	.120 <T	.060 <T	.	.	.260 <T	.100 <T
OCT	.210 <T	.100 <T	.	.	.	.	.	.
NOV	.040 <T	.060 <T	.	.	.060 <T	.040 <T	.050 <T	.070 <T
DEC	BDL	.080 <T	.	.	.080 <T	.090 <T	.150 <T	.090 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.100		GUIDELINE = 50. (A1)			

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1	SITE 2	SITE 3	STANDING	FREE FLOW
			STANDING	STANDING	STANDING	STANDING	FREE FLOW
MAY	.	.	1.700	1.200	.	.600 <T	.480 <T
JUN	.	.	.210 <T	.360 <T	.	.250 <T	.190 <T
JUL	.	.	.190 <T	.460 <T	.	.290 <T	.230 <T
SEP	2.800	4.100	.610 <T	1.300	.	.630 <T	.310 <T
OCT	3.000	.810 <T	.	.	.	.	.
NOV	3.100	1.400	.	2.900	3.000	BDL	.700 <T
DEC	1.200	1.400	.	1.300	.310 <T	.750 <T	1.800
COPPER (UG/L)							
			DET'N LIMIT = .100	GUIDELINE = 1000 (A3)			
MAY	.	.	130.000	80.000	.	37.000	4.800
JUN	.	.	380.000	66.000	.	14.000	3.900
JUL	.	.	190.000	82.000	.	24.000	3.100
SEP	1.100	.680 <T	540.000	120.000	.	36.000	4.300
OCT	1.600	.600 <T	.	.	.	.	.
NOV	1.000 <T	.700 <T	.	89.000	29.000	19.000	6.800
DEC	.740 <T	.390 <T	.	230.000	24.000	26.000	3.400
IRON (UG/L)							
			DET'N LIMIT = 4.000	GUIDELINE = 300. (A3)			
MAY	.	.	19.000 <T	15.000 <T	.	13.000 <T	6.100 <T
JUN	.	.	21.000 <T	7.600 <T	.	BDL	BDL
JUL	.	.	7.300 <T	13.000 <T	.	6.400 <T	BDL
SEP	15.000 <T	BDL	15.000 <T	90.000	.	5.700 <T	6.500 <T
OCT	79.000	BDL	.	.	.	.	.
NOV	33.000 <T	BDL	.	37.000 <T	69.000	9.200 <T	17.000 <T
DEC	BDL	BDL	.	26.000 <T	17.000 <T	11.000 <T	5.700 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
MERCURY (UG/L)			GUIDELINE = 1.000 (A1)					
DET'N LIMIT = 0.010								
MAY	.	.	.	BDL	.	.	.	BDL
JUN	.	.	.	BDL	.	.	.	.020 <T
JUL	.	.	.	.020 <T	.	.	.	.070
SEP	BDL	BDL	.	BDL	.	.	.	.040 <T
OCT	.020 <T	BDL	.	.	.	.	.	.
NOV	.030 <T	.030 <T	.	.	.	BDL	.	.060
DEC	BDL	BDL	.	.	.	BDL	.	.080
MANGANESE (UG/L)			GUIDELINE = 50.0 (A3)					
DET'N LIMIT = .050								
MAY	.	.	2.200	1.900	.	.	.770	.640
JUN	.	.	6.100	1.700	.	.	.730	.520
JUL	.	.	1.400	1.700	.	.	.780	.520
SEP	1.600	.700	9.700	6.500	.	.	.740	.480 <T
OCT	89.000	1.100	.	.	.	.	.	.
NOV	3.700	2.000	.	.	2.400	3.000	1.500	2.300
DEC	.080 <T	.980	.	.	.880	.930	.850	.770
MOLYBDENUM (UG/L)			GUIDELINE = 500 (H)					
DET'N LIMIT = 0.020								
MAY	.	.	.130 <T	.100 <T	.	.	.140 <T	.140 <T
JUN	.	.	.170 <T	.170 <T	.	.	.160 <T	.160 <T
JUL	.	.	.170 <T	.160 <T	.	.	.150 <T	.150 <T
SEP	.040 <T	.100 <T	.050 <T	.060 <T	.	.	.070 <T	.140 <T
OCT	.110 <T	.120 <T	.	.	.	.	.	.
NOV	.120 <T	.130 <T	.	.	.050 <T	.130 <T	.140 <T	.090 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM				
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.150 <T	.100 <T	.	.	.120 <T	.130 <T	.110 <T	.100 <T
MICKEL (UG/L)			DET'N LIMIT = 0.100 GUIDELINE = 50. (F3)					
MAY	.	.	.180 <T	BDL	.	.	.430 <T	BDL
JUN	.	.	.980 <T	.220 <T	.	.	2.600	.390 <T
JUL	.	.	1.400 <T	.420 <T	.	.	4.300	.430 <T
SEP	BDL	BDL	5.300	BDL	.	.	1.800 <T	.170 <T
OCT	.740 <T	.390 <T	.	.	.	.	.	.
NOV	BDL	BDL	.	.	BDL	BDL	9.000	BDL
DEC	.160 <T	.180 <T	.	.	.510 <T	.230 <T	2.200	.180 <T
LEAD (UG/L)			DET'N LIMIT = 0.050 GUIDELINE = 50. (A1)					
MAY	.	.	1.400	4.700	.	.	1.200	.230
JUN	.	.	3.600	.560	.	.	1.100	.260
JUL	.	.	4.100	.660	.	.	1.900	.200 <T
SEP	.090 <T	.170 <T	6.800	1.300	.	.	2.100	.250
OCT	.120 <T	BDL	.	.	.	.	.	.
NOV	.200 <T	.090 <T	.	.	1.300	.390	1.800	.530
DEC	BDL	BDL	.	.	2.000	.260	1.500	.350
ANTIMONY (UG/L)			DET'N LIMIT = .050 GUIDELINE = 146. (D4)					
MAY	.	.	.060 <T	.100 <T	.	.	.060 <T	.070 <T
JUN	.	.	.120 <T	.090 <T	.	.	.080 <T	.060 <T
JUL	.	.	.110 <T	.050 <T	.	.	.060 <T	.050 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	.510	.690	.440	.	.	.630	.280
OCT	.460	.	.	.	.	.	.
NOV	.490	.	.	.450	.510	.400	.400
DEC	.180 <T	.	.	.270	.200 <T	.190 <T	.210
SELENIUM (UG/L)		DET'N LIMIT = 0.200		GUIDELINE = 10. (A1)			
MAY	.	.540 <T	BDL	.	.	.540 <T	BDL
JUN	.	BDL	.280 <T	.	.	BDL	.690 <T
JUL	.	BDL	.530 <T	.	.	1.500 <T	1.000 <T
SEP	BDL	BDL	BDL	.	.	BDL	BDL
OCT	1.400 <T	.	.	.	.	.	.
NOV	.830 <T	.	.	.670 <T	.750 <T	.280 <T	.710 <T
DEC	BDL	.	.	BDL	BDL	.550 <T	BDL
STROMTIUM (UG/L)		DET'N LIMIT = .050		GUIDELINE = 200. (N)			
MAY	.	26.000	25.000	.	.	26.000	26.000
JUN	.	26.000	25.000	.	.	26.000	26.000
JUL	.	30.000	27.000	.	.	27.000	25.000
SEP	26.000	28.000	28.000	.	.	28.000	27.000
OCT	23.000	.	.	.	.	.	.
NOV	25.000	.	.	28.000	27.000	26.000	25.000
DEC	24.000	.	.	25.000	24.000	23.000	23.000
TITANIUM (UG/L)		DET'N LIMIT = .050		GUIDELINE = N/A			
MAY	.	2.700	2.800	.	.	2.800	2.600

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	"	"	2.200	2.200	"	"	2.300	2.300
JUL	"	"	1.400 <T	1.900 <T	"	"	1.800 <T	1.900 <T
SEP	2.200	1.300 <T	1.100 <T	1.300 <T	"	"	.860 <T	.700 <T
OCT	3.400	2.300	"	"	"	"	"	"
NOV	5.300	3.700	"	"	3.900	4.100	3.900	4.100
DEC	2.500	2.100	"	"	2.500	2.500	2.100	2.400
THALLIUM (UG/L)			DET'N LIMIT = .010		GUIDELINE = 13. (04)			
MAY	"	"	BOL	BOL	"	"	BOL	BOL
JUN	"	"	BOL	BOL	"	"	BOL	BOL
JUL	"	"	BOL	BOL	"	"	BOL	BOL
SEP	"	"	BOL	BOL	"	"	BOL	BOL
OCT	.110 <T	.070 <T	BOL	.040 <T	"	"	BOL	.020 <T
NOV	BOL	BOL	"	"	"	"	BOL	BOL
DEC	.020 <T	BOL	"	"	BOL	.040 <T	"	"
			BOL	"	BOL	BOL	BOL	BOL
URANIUM (UG/L)			DET'N LIMIT = .020		GUIDELINE = 20. (A2)			
MAY	"	"	BOL	BOL	"	"	.030 <T	BOL
JUN	"	"	.030 <T	.050 <T	"	"	.060 <T	.050 <T
JUL	"	"	BOL	.030 <T	"	"	BOL	BOL
SEP	"	"	BOL	.040 <T	"	"	.050 <T	.030 <T
OCT	BOL	BOL	"	"	"	"	"	"
NOV	.060 <T	BOL	"	"	BOL	.080 <T	.040 <T	BOL
DEC	.050 <T	BOL	"	"	.050 <T	BOL	BOL	BOL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
VANADIUM (UG/L)		DET'M LIMIT = .050					
		GUIDELINE = 100 (H)					
MAY	"	.300 <T	.310 <T	"	"	.330 <T	.370 <T
JUN	"	.240 <T	.290 <T	"	"	.320 <T	.330 <T
JUL	"	.250 <T	.330 <T	"	"	.360 <T	.380 <T
SEP	.320 <T	.370 <T	.490 <T	"	"	.500 <T	.490 <T
OCT	.560	"	"	"	"	"	"
NOV	.550	"	"	.450 <T	.470 <T	.470 <T	.520
DEC	.270 <T	"	"	.420 <T	.450 <T	.490 <T	.450 <T
	.260 <T	"	"	"	"	"	"
ZINC (UG/L)		DET'M LIMIT = .001					
		GUIDELINE = 5.00 (A3)					
MAY	"	8.700	5.000	"	"	5.800	.850 <T
JUN	"	9.700	.840 <T	"	"	3.900	.570 <T
JUL	"	8.100	1.700	"	"	7.900	.350 <T
SEP	.830 <T	25.000	2.200	"	"	8.800	.580 <T
OCT	1.600	"	"	"	"	"	"
NOV	.950 <T	"	"	6.900	1.500	7.800	1.700
DEC	.470 <T	"	"	11.000	.780 <T	18.000	1.000 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE	TREATED	SITE 1		SITE 2		SITE 3	
TYPE		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROPHENOLS							
2,4,6-TRICHLOROPHENOL (NG/L)		DET'N LIMIT = 50.		GUIDELINE = 5000 (B1)			
NDV	BDL	20,000 <T	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BASE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB								
ALPHA BHC (MG/L)			DET/M LIMIT = 1.000		GUIDELINE = 700 (G)			
MAY	"	"	"	5.000 <T	"	"	"	5.000 <T
JUN	"	"	"	8.000 <T	"	"	"	BOL
JUL	"	"	"	7.000 <T	"	"	"	7.000 <T
SEP	5.000 <T	5.000 <T	"	5.000 <T	"	"	"	8.000 <T
OCT	4.000 <T	3.000 <T	"	"	"	"	"	"
NOV	4.000 <T	5.000 <T	"	"	"	3.000 <T	"	4.000 <T
DEC	4.000 <T	BOL	"	"	"	6.000 <T	"	BOL
LINDANE (MG/L)			DET/M LIMIT = 1.000		GUIDELINE = 4000 (AT)			
MAY	"	"	"	BOL	"	"	"	BOL
JUN	"	"	"	2.000 <T	"	"	"	BOL
JUL	"	"	"	2.000 <T	"	"	"	3.000 <T
SEP	1.000 <T	1.000 <T	"	1.000 <T	"	"	"	3.000 <T
OCT	2.000 <T	2.000 <T	"	"	"	"	"	"
NOV	BOL	BOL	"	"	"	BOL	"	BOL
DEC	BOL	BOL	"	"	"	1.000 <T	"	BOL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE	TREATED	SITE 1		SITE 2		SITE 3	
TYPE		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS							
PHENOLICS (UG/L)		DET'N LIMIT = 0.2		GUIDELINE = 2.00 (A3)			
SEP	BDL						
OCT	1,000						
NOV	5,600						
DEC	1,000						

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES								
TOLUENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 24.0 (84)			
MAY	.	.	.	BDL	.	.	.	BDL
JUN	.	.	.	.050 <T	.	.	.	.100 <T
JUL	.	.	.	BDL	.	.	.	BDL
SEP	BDL	BDL	.	BDL	.	.	.	BDL
OCT	BDL	BDL	.	.	.	.	.	.
NOV	.050 <T	.050 <T	.	.	.	BDL	.	.050 <T
DEC	BDL	BDL	.	.	.	.050 <T	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = .050		GUIDELINE = 2.4 (84)			
MAY	.	.	.	BDL	.	.	.	BDL
JUN	.	.	.	.100 <T	.	.	.	.050 <T
JUL	.	.	.	BDL	.	.	.	.100 <T
SEP	BDL	BDL	.	BDL	.	.	.	BDL
OCT	.050 <T	.050 <T	.	.	.	.	.	.
NOV	.100 <T	.150 <T	.	.	.	.050 <T	.	.100 <T
DEC	.050 <T	.050 <T	.	.	.	BDL	.	.050 <T
M-XYLENE (UG/L)			DET'N LIMIT = .100		GUIDELINE = 300 (84)			
MAY	.	.	.	BDL	.	.	.	BDL
JUN	.	.	.	.100 <T	.	.	.	BDL
JUL	.	.	.	BDL	.	.	.	.100 <T
SEP	BDL	BDL	.	BDL	.	.	.	BDL
OCT	BDL	BDL	.	.	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	BOL	.200 <T	.	.	.	BOL	.	BOL
DEC	BOL	BOL	.	.	.	BOL	.	BOL
O-XYLENE (UG/L)			DET'M LIMIT = .050		GUIDELINE = 300 (B4)			
MAY	.	.	.	BOL	.	.	.	BOL
JUN	.	.	.	.050 <T	.	.	.	.050 <T
JUL	.	.	.	BOL	.	.	.	.050 <T
SEP	BOL	BOL	.	BOL	.	.	.	BOL
OCT	BOL	BOL	.	.	.	.	.	.
NOV	BOL	.050 <T	.	.	.	BOL	.	BOL
DEC	BOL	BOL	.	.	.	BOL	.	BOL
STYRENE (UG/L)			DET'M LIMIT = .050		GUIDELINE = 46.5 (D2)			
OCT	.400 <T	BOL	.	.	.	.	.	.
NOV	.650 UCS	.150 <T	.	.	.	.400 <T	.	.450 <T
DEC	BOL	BOL	.	.	.	BOL	.	BOL
CHLOROFORM (UG/L)			DET'M LIMIT = .100		GUIDELINE = 350 (A1+)			
MAY	.	.	.	33.200	.	.	.	37.600
JUN	.	.	.	39.500	.	.	.	37.900
JUL	.	.	.	49.400	.	.	.	59.000
SEP	.100 <T	44.500	.	41.100	.	.	.	48.900
OCT	.400 <T	46.300	.	.	.	.	.	.
NOV	BOL	36.700	.	.	.	34.500	.	31.300

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BARE POINT WTP) 1988

WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW TREATED	SITE 1		SITE 2		SITE 3	
		STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	BDL	36.200	.	.	40.900	.	35.700
DICHLOROBROMOMETHANE (UG/L)		DET'M LIMIT = .050		GUIDELINE = 350 (A1+)			
MAY	.	.	5.050	.	.	.	5.300
JUN	.	.	5.550	.	.	.	5.600
JUL	.	.	6.600	.	.	.	8.150
SEP	BDL	5.100	4.900	.	.	.	5.400
OCT	BDL	4.450	.	.	.	.	.
NOV	BDL	3.250	.	.	2.200	.	1.950
DEC	BDL	3.350	.	.	4.600	.	4.200
CHLORO Dibromomethane (UG/L)		DET'M LIMIT = .100		GUIDELINE = 350 (A1+)			
MAY	.	.	1.400	.	.	.	1.400
JUN	.	.	.400 <T	.	.	.	.400 <T
JUL	.	.	.500 <T	.	.	.	.500 <T
SEP	BDL	.400 <T	.400 <T	.	.	.	.900 <T
OCT	BDL	.400 <T	.	.	.	.	.
NOV	BDL	.300 <T	.	.	.200 <T	.	.200 <T
DEC	BDL	.400 <T	.	.	.600 <T	.	.500 <T
TOTL TRINALOMETHANES (UG/L)		DET'M LIMIT = .500		GUIDELINE = 350 (A1)			
MAY	.	.	39.650	.	.	.	44.300
JUN	.	.	45.450	.	.	.	43.900
JUL	.	.	56.500	.	.	.	67.650

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM THUNDER BAY (BAKE POINT WTP) 1988

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	BDL	50.000	.	46.400	.	.	.	55.200
OCT	BDL	51.150	.	.	.	.	.	.
NOV	BDL	40.250	.	.	.	36.900	.	33.450
DEC	BDL	39.950	.	.	.	46.100	.	40.400

Table VI

<u>SCAN/PARAMETER</u>	<u>UNIT</u>	<u>DETECTION</u> <u>LIMIT</u>	<u>GUIDELINE</u>
BACTERIOLOGICAL			
STANDARD PLATE COUNT MEMBRANE FILTRATION	CT/ML	0	500/ML(A1)
P/A BOTTLE		0	0 (A1*)
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML(A1)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
CHLORODROMATICS			
HEXACHLOROBUTADIENE	NG/L	1.000	450. (D4)
1,2,3-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,4-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.000	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.000	10000 (D4)
HEXACHLOROBENZENE	NG/L	1.0	10. (C1)
HEXACHLOROETHANE	NG/L	1.000	1900. (D4)
OCTACHLOROSTYRENE	NG/L	1.000	N/A
PENTACHLOROBENZENE	NG/L	1.000	74000 (D4)
2,3,6-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,6,8-TRICHLOROTOLUENE	NG/L	5.000	N/A
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	50.	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	50.	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	50.	N/A
2,4,5-TRICHLOROPHENOL	NG/L	50.	260000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	50.	5000. (B1)
PENTACHLOROPHENOL	NG/L	50.	60000. (B1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD PH	DMSNLESS	N/A	6.5-8.5(A4)
FIELD TEMPERATURE	°C	N/A	<15 °C(A1)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	.200	30-500(A4)
CALCIUM	MG/L	.100	100. (F2)
CYANIDE	MG/L	.001	.20(A1)
CHLORIDE	MG/L	.200	250. (A3)
COLOUR	TCU	.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.	400. (F2)
FLUORIDE	MG/L	.01	2.4 (A1)
HARDNESS	MG/L	.50	80-100(A4)
MAGNESIUM	MG/L	.05	30. (F2)
SODIUM	MG/L	.20	200. (C3)
AMMONIUM TOTAL	MG/L	.002	.05(F2)
NITRITE	MG/L	.001	1.0 (A1)
TOTAL NITRATES	MG/L	.02	10. (A1)
NITROGEN TOTAL KJELDAHL	MG/L	.02	N/A
PH	DMSNLESS	N/A	6.5-8.5(A4)
PHOSPHORUS FIL REACT	MG/L	.0005	N/A
PHOSPHORUS TOTAL	MG/L	.002	.40(F2)
TOTAL SOLIDS	MG/L	1.	500. (A3)
TURBIDITY	FTU	.02	1.0 (A1)

METALS

BORON	UG/L	.200	5000.	(A1)
		DETECTION		
<u>SCAN/PARAMETER</u>	<u>UNIT</u>	<u>LIMIT</u>	<u>GUIDELINE</u>	
BERYLLIUM	UG/L	.010	0.20	(H)
CADMIUM	UG/L	.050	5.0	(A1)
COBALT	UG/L	.020	1000.	(H)
CHROMIUM	UG/L	.100	50.	(A1)
COPPER	UG/L	.100	1000.	(A3)
IRON	UG/L	4.0	300.	(A3)
MERCURY	UG/L	.01	1.0	(A1)
MANGANESE	UG/L	.050	50.	(A3)
MOLYBDENUM	UG/L	.020	500.	(H)
NICKEL	UG/L	.100	50.	(F3)
LEAD	UG/L	.050	50.	(A1)
SELENIUM	UG/L	.200	10.	(A1)
SILVER	UG/L	.020	50.	(A1)
STRONTIUM	UG/L	.050	2000.	(H)
THALLIUM	UG/L	.010	13.	(D4)
TITANIUM	UG/L	.050	N/A	
URANIUM	UG/L	.020	20.	(A2)
VANADIUM	UG/L	.050	100.	(H)
ZINC	UG/L	.020	500.	(A3)

PHENOLICS

PHENOLICS (UNFILTERED REACTIVE)	UG/L	.2	2.0	(A3)
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PESTICIDES & PCB

ALDRIN	NG/L	1.0	700.	(A1)
AMETRINE	NG/L	50.	300000.	(D3)
ATRAZINE	NG/L	50.	60000.	(B3)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700.	(G)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300.	(G)
GAMMA HEXACHLOROCYCLOHEXANE(LINDANE)	NG/L	1.0	4000.	(A1)
ALPHA CHLORDANE	NG/L	2.0	7000.	(A1)
GAMMA CHLORDANE	NG/L	2.0	7000.	(A1)
BLADEX	NG/L	100.	10000.	(B3)
DIELDRIN	NG/L	2.0	700.	(A1)
METHOXYCHLOR	NG/L	5.0	100000.	(A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000.	(D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	4.0	74000.	(D4)
ENDRIN	NG/L	4.0	200.	(A1)
ENDOSULFAN SULPHATE(THIODAN SULPHATE)	NG/L	4.0	N/A	
HEPTACHLOR EPOXIDE	NG/L	1.0	3000.	(A1)
HEPTACHLOR	NG/L	1.0	3000.	(A1)
METOLACHLOR	NG/L	500.	50000.	(B3)
MIREX	NG/L	5.0	N/A	
OXYCHLORDANE	NG/L	2.0	N/A	
O,P-DDT	NG/L	5.0	30000.	(A1)
PCB	NG/L	20.0	3000.	(A2)
O,P-DDD	NG/L	5.0	N/A	
PPDDE	NG/L	1.0	30000.	(A1)
PPDDT	NG/L	5.0	30000.	(A1)
ATRAZONE	NG/L	50.	N/A	
ALACHLOR	NG/L	500.	35000.	(D2)
PROMETONE	NG/L	50.	52500.	(D3)
PROPAZINE	NG/L	50.	16000.	(D2)
PROMETRYNE	NG/L	50.	1000.	(B3)
SENCOR (METRIBUZIN)	NG/L	100.	80000.	(B2)
SIMAZINE	NG/L	50.	10000.	(B3)

POLYAROMATIC HYDROCARBONS

PHENANTHRENE	NG/L	10.0	N/A	
ANTHRACENE	NG/L	1.0	N/A	
FLUORANTHENE	NG/L	20.0	42000.	(D4)
PYRENE	NG/L	20.0	N/A	
BENZO(A)ANTHRACENE	NG/L	20.0	N/A	
CHRYSENE	NG/L	50.0	N/A	
DIMETHYL BENZO(A)ANTHRACENE	NG/L	5.0	N/A	
BENZO(E)PYRENE	NG/L	50.0	N/A	
BENZO(B)FLUORANTHENE	NG/L	10.0	N/A	
PERYLENE	NG/L	10.0	N/A	
BENZO(K)FLUORANTHENE	NG/L	1.0	N/A	
BENZO(A)PYRENE	NG/L	5.0	10.	(B1)

BENZO(G,H,I)PERYLENE

<u>SCAN/PARAMETER</u>	<u>UNIT</u>	<u>DETECTION</u>	
		<u>LIMIT</u>	<u>GUIDELINE</u>
DIBENZO(A,H)ANTHRACENE	NG/L	10.0	N/A
INDENO(1,2,3-C,D)PYRENE	NG/L	20.0	N/A
BENZO(B)CHRYSENE	NG/L	2.0	N/A
CORONENE	NG/L	10.0	N/A

SPECIFIC PESTICIDES

TOXAPHENE	NG/L	N/A	5000. (A1)
2,4,5-TRICHLOROBUTYRIC ACID (2,4,5-T)	NG/L	50.	280000. (B1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000. (A1)
2,4-DICHLOROPHEOXYBUTYRIC ACID	NG/L	200.	18000. (B3)
2,4-D PROPIONIC ACID	NG/L	100.	N/A
DICAMBA	NG/L	100.	87000. (B3)
PICHLORAM	NG/L	100.	2450000. (D3)
SILVEX (2,4,5-TP)	NG/L	50.	10000. (A1)
DIAZINON	NG/L	20.	14000. (A1)
DICHLOROVOS	NG/L	20.	N/A
DURSBAN	NG/L	20.	N/A
ETHION	NG/L	20.	35000. (G)
GUTHION	NG/L	N/A	N/A
MALATHION	NG/L	20.	160000. (G)
MEVINPHOS	NG/L	20.	N/A
METHYL PARATHION	NG/L	50.	7000. (B3)
METHYLTRITHION	NG/L	20.	N/A
PARATHION	NG/L	20.	35000. (B1)
PHORATE (THIMET)	NG/L	20.	35. (D2)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
AMINOCARB	NG/L	N/A	N/A
BENONYL	NG/L	N/A	N/A
BUX (METALKAMATE)	NG/L	2000.	N/A
CARBOFURAN	NG/L	2000.	18000. (D3)
CICP (CHLOROPROPHAM)	NG/L	2000.	350000. (G)
DIALATE	NG/L	2000.	30000. (H)
EPTAM	NG/L	2000.	N/A
IPC	NG/L	2000.	N/A
PROPOXUR (BAYGON)	NG/L	2000.	90000. (G)
SEVIN (CARBARYL)	NG/L	200.	70000. (A1)
SUTAN (BUTYLATE)	NG/L	2000.	245000. (D3)

VOLATILES

BENZENE	UG/L	.050	5.0 (B1)
TOLUENE	UG/L	.050	24.0 (B4)
ETHYLBENZENE	UG/L	.050	2.4 (B4)
PARA-XYLENE	UG/L	.100	300. (B4)
META-XYLENE	UG/L	.100	300. (B4)
ORTHO-XYLENE	UG/L	.050	300. (B4)
1,1-DICHLOROETHYLENE	UG/L	.100	7.0 (D1)
ETHYLENE DIBROMIDE	UG/L	.05	50. (G)
METHYLENE CHLORIDE	UG/L	.500	1750. (D3)
TRANS-1,2-DICHLOROETHYLENE	UG/L	.100	350. (D3)
1,1-DICHLOROETHANE	UG/L	.100	N/A
CHLOROFORM	UG/L	.100	350. (A1+)
1,1,1-TRICHLOROETHANE	UG/L	.020	200. (D1)
1,2-DICHLOROETHANE	UG/L	.050	5.0 (D1)
CARBON TETRACHLORIDE	UG/L	.200	5.0 (D1)
1,2-DICHLOROPROPANE	UG/L	.050	10.0 (G)
TRICHLOROETHYLENE	UG/L	.100	5.0 (D1)
DICHLOROBROMOMETHANE	UG/L	.050	350. (A1+)
1,1,2-TRICHLOROETHANE	UG/L	.050	.60(D4)
CHLORODIBROMOMETHANE	UG/L	.100	350. (A1+)
TETRACHLOROETHYLENE	UG/L	.050	10.0 (C2)
BROMOFORM	UG/L	.200	350. (A1+)
1,1,2,2-TETRACHLOROETHANE	UG/L	.050	0.17(D4)
CHLOROBENZENE	UG/L	.100	1510. (D3)
1,4-DICHLOROBENZENE	UG/L	.100	5.0 (B1)
1,3-DICHLOROBENZENE	UG/L	.100	130. (G)
1,2-DICHLOROBENZENE	UG/L	.050	200. (B1)
TRIFLUOROCHLOROTOLUENE	UG/L	.100	N/A
TOTAL TRIHALOMETHANES	UG/L	.500	350. (A1)
STYRENE	UG/L	.05	46.5 (D2)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant

visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in

this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant,

- preferably a lab area;
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used,

dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems

may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will e be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

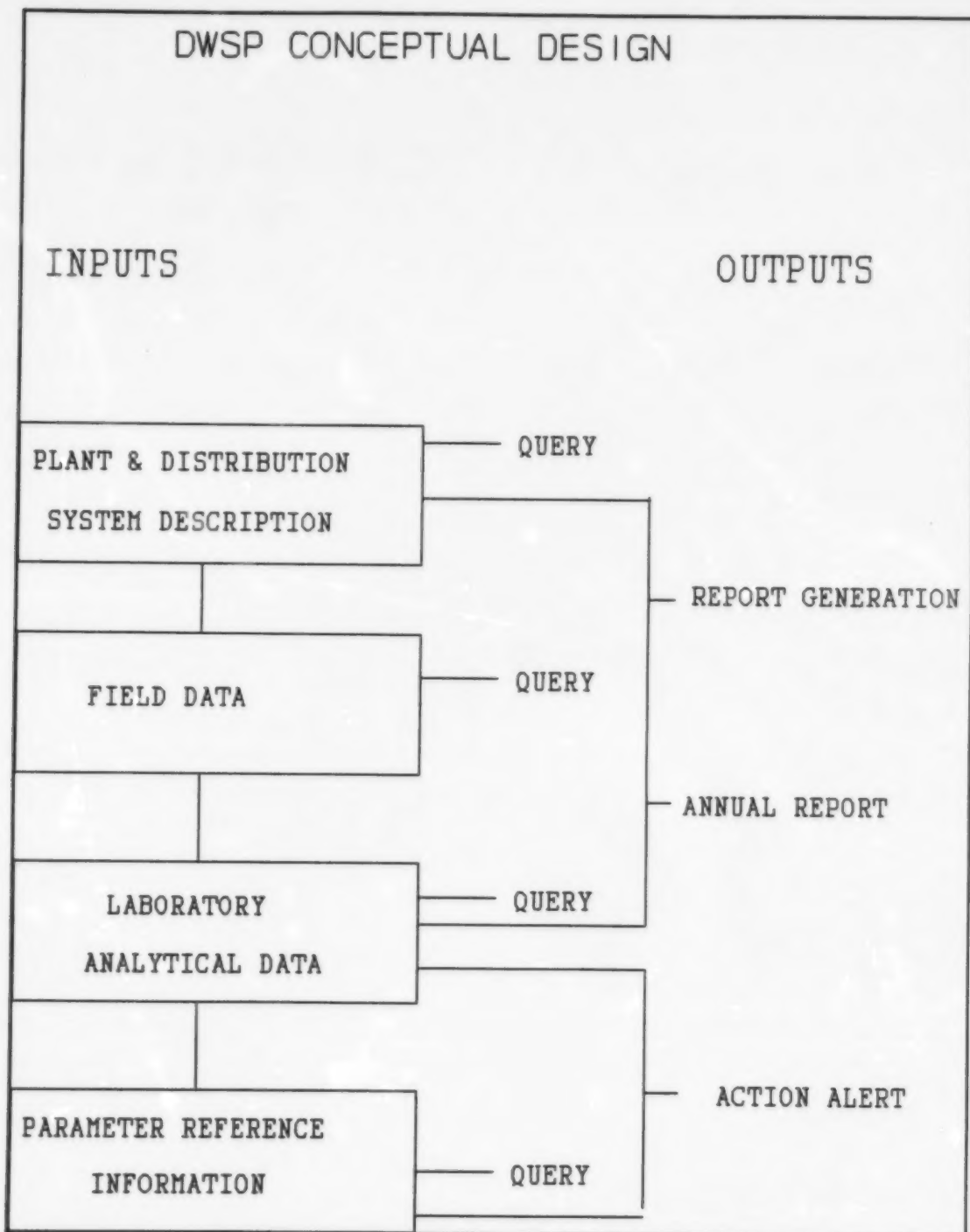


FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P)
BENZENE

PARAMETER REFERENCE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA	C 86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA	C 80/11		NOMETH	6.60	063000 UG/L	
FERC	C 84/05		NOMETH	1.00	063000 UG/L	
WHO	C 84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE

CAS#: 71432

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L

SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27),
CYCLOHEXATRIENE (41)CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE,
NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE,
AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES:

SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)

THRESHOLD ODOUR: NO DATA

THRESHOLD TASTE: 0.5 MG/L IN WATER (39)

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING
ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL
TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE
MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL

QUANTITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY

SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL
TAR DISTILLATION, FOOD PROCESSING, TANNING.USES: PREPARATION OF ETHYL BENZENE USED AS A STYRENE
MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN
PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY,
DEGREASING AND CLEANSING AGENT, GASOLINE.TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES
MUCOUS MEMBRANES, SYMPTOMS INCLUDE RESTLESSNESS,
CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE;
CHRONIC - ANEMIA AND LEUKEMIA (45).

CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN

REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM
FOLLOWED BY SEDIMENTATION, COAGULATION AND
FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).

MOLECULAR WEIGHT: 78.12 GRAMS

MELTING POINT: 5.5 DEGREES C (27)

BOILING POINT: 80.1 DEGREES C (27)

SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)

VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C

HENRY'S LAW CONSTANT: 0.00555 ATM M₂/MOLE

LOG OCT./WATER PAR.COEFF:K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC), (OWTRI), (OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (Caution: NaOH is corrosive)

Mercury

- 250 mL clear glass bottle
- rinse bottle and cap three times, discard then fill to top of label
- add 20 drops each nitric acid and potassium dichromate
- (Caution: HNO_3 and KCrO_7 corrosive)

Phenols

- 250 mL clear glass bottle
- do not rinse bottle
- fill to top of label as marked

Steps

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry

- 500 mL clear plastic bottle
- rinse bottle with sample three times and discard
- fill to line

Metals

- 500 mL clear plastic bottle with white lid
- rinse bottle and cap three times, discard
- fill to line
- add 10 drops nitric acid
(Caution: HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (Caution: HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC), (OWTRI)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (Caution: NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (Caution: HNO_3 and KCrO_7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.



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MEMORANDUM

FROM: Patricia Lachmaniuk
Drinking Water Assessment Specialist
Drinking Water Section
Water Resources Branch
1 St Clair Avenue West
Toronto, Ontario
M4V 1K6

DATE: May 9, 1989

Re: DRINKING WATER SURVEILLANCE PROGRAM (DWSP) 1988 ANNUAL REPORT

Enclosed are draft copies of the 1988 Annual Reports for the Thunder Bay (Bare Pt) and (Loch Lomond) water treatment plants prepared by the Drinking Water Surveillance Program (DWSP).

Please review the report and return with any comments within four weeks.

If you have any questions or concerns, please contact me at the above address or at 323-4880.

Patricia Lachmaniuk

PL/pl